

## Appendix B.

# Sampling and Estimation Procedures and Sampling Error Tables

The estimates presented in this bulletin are based on annual averages of monthly data obtained from the CPS, a sample survey of the civilian noninstitutional population. The survey is conducted each month by the Bureau of the Census for BLS, and provides comprehensive data on the labor force, employed, and unemployed, including such characteristics as age, sex, race, Hispanic origin, occupation, and industry. The survey also provides data on the characteristics of those not in the labor force.

Each month, trained interviewers collect information from a scientifically-selected sample (about 50,000 occupied housing units), designed to represent the civilian noninstitutional population. Selected respondents are interviewed to obtain information about the employment status of each household member 16 years of age and over. The “reference week” is the calendar week (Sunday through Saturday) which includes the 12th of the month. Actual field interviewing is conducted during the following week, which is known as the “survey” week.

### Sampling procedures

The 1998 sample encompasses 754 sample areas, with coverage in every State and the District of Columbia. It is based to a large extent on information about the distribution of the population as reported in the 1990 decennial census. (A re-designed 1990 census-based sample was phased in during the April 1994 through July 1995 period.) These areas were selected by dividing the entire area of the United States into 2,007 primary sampling units (PSUs). With some minor exceptions, a PSU consists of a county or number of contiguous counties. Most metropolitan areas constitute separate PSUs.

To improve the efficiency of the sample, the 2,007 PSUs are grouped into strata within each State. Then, one PSU is selected from each stratum, with the probability of selection proportionate to the relative population size of the PSU. PSUs in strata by themselves are called “self-representing” and are generally the most populous in each State. Other strata are formed by combining PSUs that are similar in such characteristics as population growth, proportion of blacks and Hispanics, occupation/industry, and age/sex distribution. PSUs selected from these strata are “non-self-representing,” since each one chosen represents the entire stratum.

Within each of the selected PSUs, the number of households to be enumerated each month is determined in two steps. First, a sample of census enumeration districts (EDs) is selected using the population size probability selection procedure. EDs are administrative units and contain, on average, about 300 households. Second, clusters of approximately four addresses (contiguous wherever possible) are selected to be enumerated within each designated ED.

Part of the sample is changed, or rotated, each month. A given rotation group is in the sample for 4 consecutive months, leaves the sample during the following 8 months, and then returns for another 4 consecutive months. A primary reason for rotating the sample is to minimize the lack of cooperation which may result from interviewing a constant panel indefinitely. The rotation plan provides for three-fourths of the sample to be identical from one month to the next and one-half to be identical with the same month a year earlier.

### Estimating methods

Under the estimating methods used in the CPS, all of the results for a given month become available simultaneously and are based on returns from the entire sample of respondents. The estimation procedure involves weighting the data from each sample person by the inverse of the probability of the person being in the sample. This gives a rough measure of the number of actual persons that each sample person represents. Through a series of estimation steps (outlined below), the selection probabilities are adjusted for noninterviews and survey undercoverage; data from previous months are incorporated into the estimates through the composite estimation procedure.

1. *Noninterview adjustment.* The weights for all interviewed households are adjusted to the extent needed to account for occupied sample households for which no information was obtained because of absence, impassable roads, refusals, or unavailability of the respondents for other reasons. This noninterview adjustment is made separately for clusters of similar sample areas that are usually, but not necessarily, contained within a State. Similarity of sample areas is based on metropolitan area status and size. Within each cluster, there is a further breakdown by residence. The proportion of sample

households not interviewed varies from 6 to 7 percent, depending upon a number of factors, including weather and vacations.

2. *Ratio estimates.* The distribution of the population selected for the sample may differ somewhat, by chance, from that of the population as a whole in such characteristics as: age, race, sex, and State of residence. Because these characteristics are closely correlated with labor force participation and other principal measurements made from the sample, the survey estimates can be substantially improved when weighted appropriately by the known distribution of these population characteristics. This is accomplished through two stages of ratio adjustment, as follows:

a. *First-stage ratio estimation.* The purpose of the first-stage ratio adjustment is to reduce the contribution to variance that results from selecting a sample of PSUs rather than drawing sample households from every PSU in the Nation. This adjustment is made to the CPS weights in two race cells: Black and nonblack; it is applied only to PSUs that are non-self-representing and for those States that have a substantial number of black households. The procedure corrects for differences that existed in each State cell at the time of the 1990 census between the race distribution of the population in sample PSUs and the race distribution of all non-self-representing PSUs.

b. *Second-stage ratio estimation.* This procedure substantially reduces the variability of estimates and corrects, to some extent, for CPS undercoverage. The CPS sample weights are adjusted to ensure that sample-based estimates of population match independent population controls. Three sets of controls are used:

- 1) 51 State controls of the civilian noninstitutional population 16 years of age and older,
- 2) National civilian noninstitutional population controls for 14 Hispanic and 5 non-Hispanic age-sex categories, and
- 3) National civilian noninstitutional population controls for 66 white, 42 black, and 10 "other" age-sex categories.

The independent population controls are prepared by projecting forward the resident population as enumerated on April 1, 1990. The projections are derived by updating demographic census data with information from a variety of other data sources that account for births, deaths, and net migration. Subtracting estimated numbers of resident Armed Forces personnel and institutionalized persons reduces the resident population to the civilian noninstitutional population. Estimates of net census undercount, determined from the Post Enumera-

tion Survey, are added to the population projections. Prior to January 1994, the projections were based on earlier censuses, and there was no correction for census undercount.

3. *Composite estimation procedure.* The last step in the preparation of most CPS estimates makes use of a composite estimation procedure. The composite estimate consists of a weighted average of two factors: (1) the second-stage ratio estimate based on the entire sample from the current month and (2) the composite estimate for the previous month, plus an estimate of the month-to-month change based on the six rotation groups common to both months. In addition, a bias adjustment term is added to the weighted average to account for relative bias associated with month-in-sample estimates. The compositing procedure results in a reduction in sampling error beyond that which is achieved after the two stages of ratio adjustment.

### Reliability of the estimates

The estimates in this bulletin are based upon a sample of the population rather than a complete count. Therefore, they may *differ* from the figures that would have been obtained if it had been possible to take a complete census using the same schedules and procedures as are used in the CPS. There are two types of errors in an estimate based on a sample survey—sampling and nonsampling. The sampling error tables provided later in this appendix indicate the magnitude of the sampling error. They also partially measure the effect of some nonsampling errors in response and enumeration, but do not measure any systematic biases in the data.

*Sampling variability.* The standard error is primarily a measure of sampling variability, that is, the variation that occurs by chance because a sample rather than the entire population is surveyed. The sample estimate and its standard error enable one to construct confidence intervals, that is, ranges that would include the average result of all possible samples with a known probability. For example, if all possible samples were selected, each of these samples were surveyed under essentially the same conditions using the same sample design, and an estimate and its estimated standard error were calculated from each sample, then the following would occur:

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average result of all possible samples.
2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples.
3. Approximately 95 percent of the intervals from two standard errors below the esti-

mate to two standard errors above the estimate would include the average result of all possible samples.

The error of a sample estimate varies inversely with the size of the sample and directly with the size of the estimate. Hence, an estimate for a subgroup constituting a small proportion of a population will tend to have a larger error relative to its size than an estimate for a larger subgroup.

### Reliability standards

The CPS sample design takes into consideration both national and State reliability. For the State data, a minimum reliability standard is set: An expected maximum coefficient of variation (CV) on the level of total unemployment of 8 percent annually. This is calculated based on a 6-percent unemployment rate. Because each State's design must meet the reliability standard, the CPS sampling rate differs by State. (The sampling rate is the proportion of all households that are selected for the sample.) Generally, the smaller the State population, the higher the sampling rate. The average State sampling rates range roughly from 1 in every 200 households to 1 in every 2,500 households in each stratum within the State.

### Publication standards for State and area CPS data

To achieve comparability of the data for regions, divisions, States, metropolitan areas, and cities for publication purposes, a unique requirement for minimum labor force, employment, or unemployment was developed for each area. This requirement is based on the known differences in sampling rates among these areas. Before estimates are published for a specific category (e.g., Hispanic unemployment in a particular State), a predetermined "critical cell" must meet a 50-percent CV requirement. As a result of this requirement, minimum bases for publication have been developed for each area. Table B-1 lists the minimum necessary base for publication of data in each of the regions, divisions, States, the District of Columbia, metropolitan areas, and cities appearing in this bulletin.

Estimates are not shown when they do not meet the minimum base for the State or area listed in table B-1. In tables showing the labor force status of the population, the critical cell is the size of the labor force of the particular population group. In all other tables, the determining factor or critical cell is the size of the base of the distribution, for example, the size of total employment or unemployment for that area or population subgroup. Data are not published for any cell with a level of fewer than 500 persons or less than 0.05 percent of the total for a given characteristic.

### Using the sampling error tables

Tables B-2 through B-5 provide sampling errors for use in constructing 90-percent confidence intervals (approximately 1.6 standard errors) for major labor force characteristics. They are approximations and thus indicate the order of magnitude

of the sampling error rather than the precise amount of the possible error in an estimate. Illustrations on the use of these tables are provided below. In all cases, the computations present the estimated levels in thousands of persons.

*Sampling error of an estimated number.* Table B-5 shows that an estimate of 50,000 unemployed persons in Maryland will have an absolute sampling error of 10,000, or a relative sampling error of 20 percent (10,000/50,000). In comparison, an estimate of 100,000 unemployed persons in Maryland has an absolute sampling error of 14,000, yielding a relative sampling error of 14 percent (14,000/100,000). A statement that unemployment in Maryland is between 40,000 and 60,000 in the first instance, and between 86,000 and 114,000 in the second, can be made with approximately 90-percent confidence.

This can be interpreted as follows: If one were to draw all possible samples and make an estimate from each sample (using the same methods and techniques) and construct an interval around each estimate (using the sampling errors shown in the tables), then 90 percent of these intervals would contain the average value of all possible samples.

To convert a sampling error from 90-percent confidence, as displayed in the tables, to 68-percent confidence (one standard error), multiply the sampling error shown in the tables by 0.63. To convert the sampling error from 90- to 95-percent confidence (approximately two standard errors) multiply the sampling error by 1.23. For the example given above, the sampling error at 90-percent confidence was 10,000. At 68-percent confidence, the error would be about 6,300 (10,000 x 0.63). At 95-percent confidence, the error would be about 12,300 (10,000 x 1.23).

*Sampling error of a difference.* To compute the error of a difference from the tables, an additional step is required. If, for instance, one wishes to know whether a change in the unemployment rate from one year to the next in a particular area for a particular population group is statistically significant, or whether the difference in the unemployment rate between two areas or population groups is statistically meaningful, the significance of the difference needs to be computed. (Differences between estimates for 2 consecutive years may be influenced to some extent by the redesign of the CPS concepts, questionnaire, and collection procedures, such as that which occurred in 1994.)

As noted above, differences can take two general forms: (1) differences between population groups and/or geographic areas; or (2) differences for the same population group and geographic area over time. Either type of difference can be calculated using the following formula, and noting the limiting covariance assumption discussed below.

$$SE_d = ((SE_1^2 + SE_2^2) - 2C \times (SE_1 \times SE_2))^{1/2}$$

where:

SE<sub>d</sub> = the sampling error of the difference.  
 SE<sub>1</sub> = the sampling error of one group or year.  
 SE<sub>2</sub> = the sampling error of another group or year.  
 C = the covariance (or relationship) term.

The SE<sub>1</sub> and SE<sub>2</sub> can be found in the appropriate table of *Geographic Profile* for each year if the comparison is between different years, because the size of the samples and, consequently, sampling errors may differ from year to year. Values for the covariance or “C” term (for employment and unemployment) for differences between *consecutive* years are as follows. For labor force or employment levels, C = 0.58; for unemployment levels or rates, C = 0.37. It is important to note that these “C” terms are usable only for calculating the sampling error of a difference for over-the-year change for the *same geographic area and population group*.

Covariance terms for the relationship between different population groups or geographic areas in this bulletin are not available. When calculating sampling errors for differences between two *different* population groups or geographic areas, a “C” term of zero must be assumed. The effect of this assumption is: (1) if the relationship between two groups, areas, or years (differences for nonconsecutive years) is small, the “C” term can legitimately be ignored and the sampling errors won’t be adversely affected, or (2) if there is a strong positive relationship between the two groups, areas, or years (differences for consecutive years), then the error computed without a “C” term will be overstated. This could lead one to erroneously state that a difference or change was *not* statistically significant when, in fact, it was. When there is a strong relationship over time for a labor force characteristic such as employment (i.e., people tend to remain employed from one year to the next), the importance of using a “C” term when calculating the sampling error of a difference over time increases greatly.

The following example illustrates how to calculate a sampling error for a difference.

Suppose one wished to know whether a *hypothetical* difference between the unemployment level of 250,000 for a particular population group in California and an unemployment level of 200,000 for the same group in New York was statistically significant at 90-percent confidence. Table B-5 gives the error for an unemployment level of 250,000 in California as approximately 23,000 and the error for an unemployment level of 200,000 in New York as 17,000. Using the formula described above without the “C” term produces the following results:

$$\begin{aligned} SE_1 &= 23; SE_2 = 17 \\ SE_1^2 + SE_2^2 &= 818 \\ SE_d &= ((SE_1^2 + SE_2^2))^{1/2} = 29 \end{aligned}$$

Because each State’s sample is independent, there is no measurable correlation between the two estimates and a “C”

term of zero can be assured. Thus, the error of the difference is approximately 29,000. Since the actual difference (50,000) is greater than the error of the difference, it can be stated, with 90-percent confidence, that the difference in the unemployment level is attributable to factors other than sampling variability alone.

*Sampling errors for unemployment rates.* Unemployment rates and error ranges for these rates are provided in tables 1, 12, and 23. This information can be used to derive a sampling error for an unemployment rate if one is needed. The error range is a 90-percent confidence interval around the unemployment rate. By subtracting the estimated unemployment rate from the upper bound of the range, the sampling error for that rate can be obtained. This sampling error can then be used in the above formula for computing the sampling error of a difference, or for whatever purpose the user chooses.

*Interpolation and extrapolation.* Although sampling errors are listed for selected levels of employment and unemployment in tables B-2 through B-5, users may wish to know the sampling error for an estimate whose value is not listed. To derive such a sampling error, it is necessary to use interpolation or extrapolation.

For example, in order to derive the sampling error for the 1998 total unemployment level in Georgia, it is necessary to use interpolation because table B-5 contains no sampling error for an unemployment level estimate of 169,000. The following formula and accompanying example show how to interpolate for this estimate.

$$SE = [((A - G) / (F - G)) \times (X - Y)] + Y$$

where:

SE = the sampling error for the estimated value.

A = the estimated value (169,000).

F = the table value (200,000) immediately above the estimated value.

G = the table value (100,000) immediately below the estimated value.

X = the sampling error of F (21,000).

Y = the sampling error of G (15,000).

$$\begin{aligned} SE &= [((169 - 100) / (200 - 100)) \times (21 - 15)] + 15 \\ SE &= (0.69 \times 6) + 15 \\ &= 4.1 + 15 \\ &= 19.1 \\ &= 19 \end{aligned}$$

If the sample-based estimate were to lie outside the boundaries of the error tables, extrapolation can be used to approxi-

mate the sampling error. The formula for extrapolation is the same as that for interpolation; however, the “F” term is the highest value in the table and the “G” term becomes the next highest value.

### **Derivation of sampling errors**

The State and area sampling errors are developed using a generalized regression procedure and are *not* based on sample data for each individual area, population group, or labor force characteristic. As with all sampling error tables produced for CPS State and area data, a number of approximations were required in order to derive sampling errors that would apply to a wide variety of items. As a result, these sampling errors indicate the order of magnitude of a sampling error rather

than a precise sampling error for any specific item. The sampling error tables are derived from standard error equations and special parameters developed by the Bureau of Labor Statistics. These parameters are available upon request to the Division of Local Area Unemployment Statistics, Room 4675, 2 Massachusetts Avenue NE, Washington, DC 20212-0001. Telephone: (202) 606-6406.

Tables B-2 through B-5 can be used for estimates pertaining to any race/ethnic group. As noted, the sampling errors are based on a generalized regression procedure and are approximate. Generally, the degree of precision in these tables is slightly greater for whites (and the total of all race/ethnic groups) than it is for blacks or Hispanics.

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**Table B-1. Minimum bases required for publication of Census region and division, State, and metropolitan area data**

(In thousands)

Census region and division, State or area	Minimum base	
	Employment	Unemployment
Northeast .....	8	40
New England .....	7	44
Middle Atlantic .....	8	38
Midwest .....	11	62
East North Central .....	11	60
West North Central .....	10	66
South .....	12	53
South Atlantic .....	11	59
East South Central .....	12	50
West South Central .....	12	48
West .....	9	47
Mountain .....	8	32
Pacific .....	9	49
Alabama .....	11	54
Alaska .....	3	5
Arizona .....	10	54
Arkansas .....	4	26
California .....	9	50
Colorado .....	13	53
Connecticut .....	11	67
Delaware .....	2	12
District of Columbia .....	1	4
Florida .....	11	47
Georgia .....	10	78
Hawaii .....	2	12
Idaho .....	3	12
Illinois .....	9	51
Indiana .....	13	99
Iowa .....	5	60
Kansas .....	7	39
Kentucky .....	13	43
Louisiana .....	10	37
Maine .....	4	18
Maryland .....	11	66
Massachusetts .....	7	54
Michigan .....	10	53
Minnesota .....	12	102
Mississippi .....	7	26
Missouri .....	17	69
Montana .....	2	8
Nebraska .....	3	35
Nevada .....	4	22
New Hampshire .....	3	29
New Jersey .....	6	38
New Mexico .....	4	14
New York .....	10	33
North Carolina .....	10	65
North Dakota .....	2	11
Ohio .....	13	52
Oklahoma .....	7	39
Oregon .....	7	34
Pennsylvania .....	7	47
Rhode Island .....	2	13
South Carolina .....	8	58
South Dakota .....	2	14
Tennessee .....	13	69
Texas .....	14	55
Utah .....	5	27
Vermont .....	1	12
Virginia .....	19	111
Washington .....	11	72
West Virginia .....	6	12
Wisconsin .....	13	87
Wyoming .....	1	6

**Table B-1. Minimum bases required for publication of Census region and division, State, and metropolitan area data — Continued**

(In thousands)

Census region and division, State or area	Minimum base	
	Employment	Unemployment
<b>Metropolitan area:</b>		
Atlanta MSA .....	8	95
Baltimore PMSA .....	11	52
Bergen-Passaic PMSA .....	6	50
Boston PMSA .....	7	58
Buffalo-Niagara Falls MSA .....	10	53
Charlotte-Gastonia-Rock Hill MSA .....	6	54
Chicago PMSA .....	7	45
Cincinnati PMSA .....	10	58
Cleveland-Lorain-Elyria PMSA .....	10	71
Columbus, Ohio MSA .....	10	56
Dallas-Fort Worth CMSA .....	11	60
Dayton-Springfield MSA .....	11	40
Denver-Boulder-Greeley CMSA .....	8	56
Detroit PMSA .....	8	51
Fort Lauderdale PMSA .....	8	46
Hartford MSA .....	11	91
Houston PMSA .....	12	56
Indianapolis MSA .....	11	92
Kansas City MSA .....	9	72
Long Beach PMSA .....	5	27
Louisville MSA .....	9	56
Memphis MSA .....	10	58
Miami PMSA .....	10	29
Milwaukee-Waukesha PMSA .....	11	70
Minneapolis-St. Paul MSA .....	9	108
Nassau-Suffolk PMSA .....	9	76
New Orleans MSA .....	7	39
New York PMSA .....	9	20
Newark PMSA .....	6	37
Newport News MSA .....	14	63
Oakland PMSA .....	8	71
Oklahoma City MSA .....	5	36
Orange County PMSA .....	8	79
Philadelphia PMSA .....	6	40
Phoenix-Mesa MSA .....	8	54
Pittsburgh MSA .....	6	49
Portland-Vancouver PMSA .....	5	38
Providence-Fall River-Warwick MSA .....	3	16
Riverside-San Bernardino PMSA .....	9	41
Rochester MSA .....	9	41
Sacramento-Yolo CMSA .....	9	48
St. Louis MSA <sup>1</sup> .....	3	22
Salt Lake City-Ogden MSA .....	13	43
San Antonio MSA .....	9	52
San Diego MSA .....	8	91
San Francisco PMSA .....	8	77
San Jose PMSA .....	7	81
Seattle-Bellevue-Everett PMSA .....	11	56
Clearwater MSA .....	10	41
Washington D.C. PMSA .....	9	73
<b>Cities:</b>		
Baltimore .....	12	20
Chicago .....	6	21
Cleveland .....	12	31
Dallas .....	12	60
Detroit .....	9	23
District of Columbia .....	1	4
Houston .....	13	35
Indianapolis .....	11	70
Los Angeles .....	6	25
Milwaukee .....	12	30
New York .....	9	18
Philadelphia .....	7	23
Phoenix .....	8	40
St. Louis .....	13	40
San Antonio .....	9	59
San Diego .....	8	84
San Francisco .....	13	27

<sup>1</sup> Data do not reflect the official U.S. Office of Management and Budget definition. See appendix C.

**Table B-2. Sampling errors at the 90-percent confidence level for estimated employment by Census region and division**

(In thousands)

Census region and division	Estimated level											
	10	20	25	50	100	200	250	400	800	1,000	1,500	2,000
Northeast .....	6	8	9	12	18	25	28	35	49	55	67	77
New England .....	5	8	9	12	17	24	27	33	46	51	61	68
Middle Atlantic .....	6	8	9	13	18	25	28	35	50	55	67	77
Midwest .....	7	10	11	15	22	31	34	43	61	68	83	95
East North Central .....	7	10	11	15	22	31	35	44	61	68	83	95
West North Central .....	7	9	11	15	21	30	33	42	58	65	78	88
South .....	7	10	11	15	22	31	34	43	61	68	83	96
South Atlantic .....	7	10	11	15	21	30	34	43	60	67	82	94
East South Central .....	7	10	11	15	21	30	33	42	58	65	78	87
West South Central .....	7	10	11	16	22	32	35	45	62	69	84	96
West .....	6	8	9	13	19	26	30	37	52	59	71	82
Mountain .....	6	8	9	13	18	25	28	36	50	55	66	74
Pacific .....	6	8	9	13	19	27	30	38	53	59	72	82
	Estimated level											
	2,500	5,000	7,500	10,000	12,500	15,000	20,000	25,000	30,000	35,000	40,000	
Northeast .....	85	116	137	152	163	171	176	171	—	—	—	—
New England .....	74	87	78	—	—	—	—	—	—	—	—	—
Middle Atlantic .....	85	115	133	145	152	153	144	—	—	—	—	—
Midwest .....	106	145	173	193	208	220	234	236	229	209	—	—
East North Central .....	105	143	167	183	194	199	196	174	—	—	—	—
West North Central .....	96	121	126	115	—	—	—	—	—	—	—	—
South .....	107	149	178	202	221	237	261	278	288	291	289	—
South Atlantic .....	104	141	166	184	196	203	206	194	—	—	—	—
East South Central .....	95	117	117	97	—	—	—	—	—	—	—	—
West South Central .....	106	140	158	166	165	155	—	—	—	—	—	—
West .....	91	125	148	165	178	187	197	197	187	—	—	—
Mountain .....	81	99	99	79	—	—	—	—	—	—	—	—
Pacific .....	91	123	144	158	166	171	167	145	—	—	—	—

**Table B-3. Sampling errors at the 90-percent confidence level for estimated unemployment by Census region and division**

(In thousands)

Census region and division	Estimated level							
	2	5	10	20	25	50	100	200
Northeast .....	2	3	4	5	6	8	12	16
New England .....	1	2	3	5	5	7	10	14
Middle Atlantic .....	2	3	4	5	6	8	12	17
Midwest .....	2	3	4	6	6	9	13	18
East North Central .....	2	3	4	6	6	9	13	18
West North Central .....	2	3	4	5	6	9	12	17
South .....	2	3	4	6	7	9	13	18
South Atlantic .....	2	3	4	6	6	9	13	18
East South Central .....	2	3	4	6	6	9	13	18
West South Central .....	2	3	4	6	7	9	13	19
West .....	2	3	4	6	7	9	13	19
Mountain .....	1	2	3	5	5	7	10	14
Pacific .....	2	3	4	6	7	10	14	20
	Estimated level							
	250	400	600	800	1,000	1,500	2,000	2,500
Northeast .....	18	23	28	32	36	44	—	—
New England .....	16	—	—	—	—	—	—	—
Middle Atlantic .....	19	23	29	33	37	—	—	—
Midwest .....	20	25	31	36	40	49	—	—
East North Central .....	20	26	31	36	40	—	—	—
West North Central .....	19	24	—	—	—	—	—	—
South .....	21	26	32	37	41	50	57	64
South Atlantic .....	20	26	32	36	41	49	—	—
East South Central .....	20	25	—	—	—	—	—	—
West South Central .....	21	26	32	37	—	—	—	—
West .....	21	27	32	37	42	51	58	—
Mountain .....	16	20	—	—	—	—	—	—
Pacific .....	22	28	34	39	44	53	—	—

**Table B-4. Sampling errors at the 90-percent confidence level for estimated employment by State**

(In thousands)

State	Estimated level											
	2	5	10	20	25	50	100	200	250	400	600	800
Alabama .....	3	5	6	9	10	14	20	28	31	38	45	51
Alaska .....	2	3	4	5	6	8	10	12	12	6	—	—
Arizona .....	3	4	6	9	10	14	19	27	30	37	44	49
Arkansas .....	2	3	4	6	6	9	13	17	19	23	26	28
California .....	3	4	6	8	9	13	19	27	30	38	46	53
Colorado .....	3	5	8	11	12	17	24	33	37	45	53	59
Connecticut .....	3	5	7	9	11	15	21	29	32	39	45	50
Delaware .....	1	2	3	4	4	6	8	10	10	9	—	—
District of Columbia .....	1	2	2	3	4	5	6	7	7	—	—	—
Florida .....	3	5	6	9	10	14	20	29	32	40	49	55
Georgia .....	3	5	7	9	11	15	21	29	33	41	49	56
Hawaii .....	1	2	3	4	5	7	9	13	13	15	14	—
Idaho .....	2	2	3	5	5	8	10	14	15	16	16	11
Illinois .....	3	4	6	8	9	13	19	26	29	37	45	51
Indiana .....	3	5	8	11	12	17	24	33	37	46	55	61
Iowa .....	2	3	5	7	8	11	15	21	23	28	33	35
Kansas .....	3	4	6	8	9	13	18	24	27	32	37	39
Kentucky .....	3	5	7	10	11	16	23	31	35	43	50	56
Louisiana .....	3	4	6	9	10	14	19	27	30	37	43	48
Maine .....	2	3	4	5	6	8	11	15	16	19	18	15
Maryland .....	3	5	7	10	11	15	21	30	33	41	49	55
Massachusetts .....	3	4	6	8	9	13	18	25	27	34	41	46
Michigan .....	3	5	7	9	10	15	21	29	32	40	49	56
Minnesota .....	3	5	7	11	12	17	23	33	36	45	53	59
Mississippi .....	2	4	5	7	8	11	16	22	24	29	33	36
Missouri .....	4	6	8	12	13	19	27	37	41	51	61	68
Montana .....	1	2	3	4	5	6	9	11	12	12	8	—
Nebraska .....	2	3	4	5	6	8	11	15	16	19	20	20
Nevada .....	2	3	4	6	6	9	12	17	18	22	23	23
New Hampshire .....	2	3	4	5	6	8	11	14	15	17	16	11
New Jersey .....	2	3	5	7	8	11	15	21	24	30	36	41
New Mexico .....	2	3	4	5	6	9	12	16	17	20	22	22
New York .....	3	4	6	9	10	14	19	27	30	38	46	53
North Carolina .....	3	5	7	9	10	15	20	29	32	40	48	54
North Dakota .....	1	2	3	4	5	6	9	10	11	8	—	—
Ohio .....	3	5	7	10	12	16	23	33	36	46	55	63
Oklahoma .....	2	4	5	7	8	11	16	22	24	30	35	38
Oregon .....	2	4	5	7	8	12	16	23	25	31	36	39
Pennsylvania .....	2	4	5	8	8	12	17	24	26	33	40	46
Rhode Island .....	1	2	3	4	5	6	9	11	12	13	10	—
South Carolina .....	3	4	6	8	9	13	18	25	28	34	40	44
South Dakota .....	1	2	3	4	5	6	8	10	11	10	—	—
Tennessee .....	3	5	7	10	11	16	23	31	35	43	52	58
Texas .....	3	6	8	11	12	17	25	35	39	49	59	68
Utah .....	2	3	5	7	8	11	15	20	22	26	29	29
Vermont .....	1	2	2	3	4	5	7	8	8	6	—	—
Virginia .....	4	6	9	13	14	20	28	40	44	55	66	74
Washington .....	3	5	7	10	11	15	22	30	33	42	50	56
West Virginia .....	2	3	4	6	7	10	13	18	20	23	26	26
Wisconsin .....	3	5	8	11	12	17	24	33	37	46	55	61
Wyoming .....	1	2	2	3	3	5	6	7	6	—	—	—



(In thousands)

State	Estimated level												
	2	5	10	20	25	50	100	200	250	400	600	800	1,000
Alabama .....	2	3	4	6	6	9	13	—	—	—	—	—	—
Alaska .....	1	1	2	2	—	—	—	—	—	—	—	—	—
Arizona .....	2	3	4	6	6	9	12	—	—	—	—	—	—
Arkansas .....	1	2	3	4	5	7	10	—	—	—	—	—	—
California .....	2	3	5	6	7	10	14	20	23	29	35	40	45
Colorado .....	2	3	4	5	6	9	12	—	—	—	—	—	—
Connecticut .....	2	3	4	6	6	9	12	—	—	—	—	—	—
Delaware .....	1	1	2	3	—	—	—	—	—	—	—	—	—
District of Columbia .....	1	1	2	2	2	—	—	—	—	—	—	—	—
Florida .....	2	3	4	5	6	8	12	17	19	24	—	—	—
Georgia .....	2	3	5	7	8	11	15	21	—	—	—	—	—
Hawaii .....	1	2	2	3	4	5	—	—	—	—	—	—	—
Idaho .....	1	1	2	3	3	5	—	—	—	—	—	—	—
Illinois .....	2	3	4	6	6	9	13	18	20	25	—	—	—
Indiana .....	2	3	5	7	7	10	14	—	—	—	—	—	—
Iowa .....	2	2	3	5	5	7	—	—	—	—	—	—	—
Kansas .....	1	2	3	5	5	7	10	—	—	—	—	—	—
Kentucky .....	2	3	4	5	6	9	12	—	—	—	—	—	—
Louisiana .....	2	3	4	6	6	9	12	17	—	—	—	—	—
Maine .....	1	2	2	3	4	5	—	—	—	—	—	—	—
Maryland .....	2	3	5	6	7	10	14	20	—	—	—	—	—
Massachusetts .....	2	2	4	5	6	8	11	15	—	—	—	—	—
Michigan .....	2	3	4	5	6	9	12	17	—	—	—	—	—
Minnesota .....	2	3	4	6	7	9	13	—	—	—	—	—	—
Mississippi .....	1	2	3	4	5	7	10	—	—	—	—	—	—
Missouri .....	2	3	5	6	7	10	14	20	—	—	—	—	—
Montana .....	1	1	2	3	3	4	—	—	—	—	—	—	—
Nebraska .....	1	2	3	4	4	—	—	—	—	—	—	—	—
Nevada .....	1	2	3	4	4	6	—	—	—	—	—	—	—
New Hampshire .....	1	2	2	3	—	—	—	—	—	—	—	—	—
New Jersey .....	2	2	4	5	6	8	11	15	—	—	—	—	—
New Mexico .....	1	2	2	4	4	5	8	—	—	—	—	—	—
New York .....	2	3	4	5	6	8	12	17	18	23	28	—	—
North Carolina .....	2	3	4	6	6	9	12	17	—	—	—	—	—
North Dakota .....	1	1	2	2	—	—	—	—	—	—	—	—	—
Ohio .....	2	3	4	6	6	9	13	18	20	—	—	—	—
Oklahoma .....	2	2	4	5	6	8	11	—	—	—	—	—	—
Oregon .....	2	3	4	5	6	8	11	—	—	—	—	—	—
Pennsylvania .....	2	3	4	6	6	9	12	17	19	24	—	—	—
Rhode Island .....	1	1	2	3	3	—	—	—	—	—	—	—	—
South Carolina .....	2	3	4	6	6	9	12	—	—	—	—	—	—
South Dakota .....	1	1	2	2	—	—	—	—	—	—	—	—	—
Tennessee .....	2	3	5	6	7	10	14	20	—	—	—	—	—
Texas .....	2	3	4	6	7	10	14	20	22	28	34	—	—
Utah .....	1	2	3	4	4	6	—	—	—	—	—	—	—
Vermont .....	1	1	2	2	—	—	—	—	—	—	—	—	—
Virginia .....	2	3	5	7	8	11	15	21	—	—	—	—	—
Washington .....	2	3	5	7	8	11	15	21	—	—	—	—	—
West Virginia .....	1	2	2	3	4	5	8	—	—	—	—	—	—
Wisconsin .....	2	3	5	6	7	10	14	—	—	—	—	—	—
Wyoming .....	1	1	1	2	—	—	—	—	—	—	—	—	—